

European Marine Board ECOP Network – ECOP Wednesdays : Earth Observations for Ocean Observations in Trinidad and Tobago

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INSTITUTE OF
MARINE AFFAIRS



EO for Ocean Observations in a nutshell

Earth Intelligence through
Earth Observations

Simple and Engaging
Science Communication

Articulation of
Socioeconomic Benefits

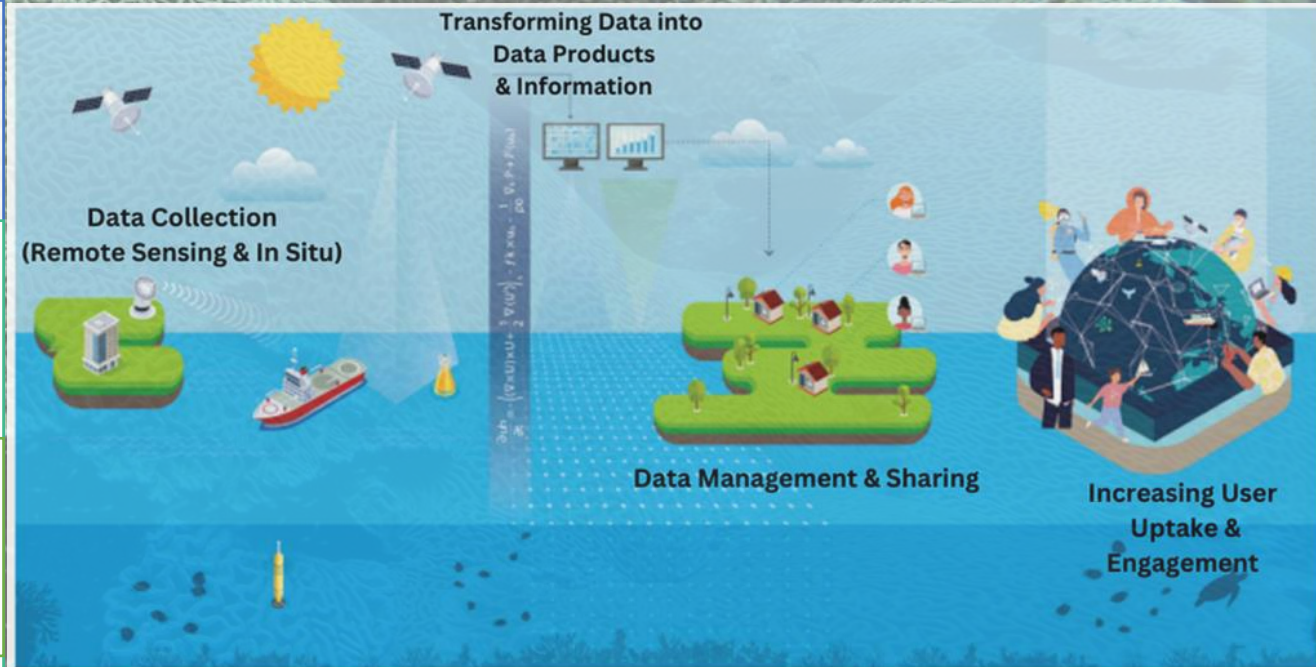


Figure 1: Ocean Observation Value Chain. © Mercator Ocean International/ EU4OceanObs

GEOMATICS UNIT - Current

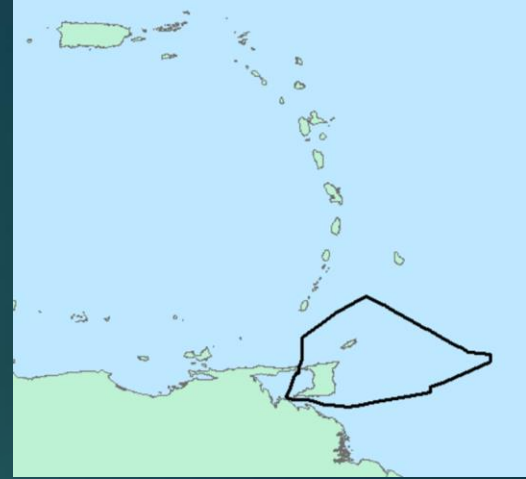
Research Programmes

- ▶ Spatial Mapping of the Living and Non-Living Coastal Resources of Trinidad and Tobago
- ▶ Marine Pollution Surveillance Programme

Research Projects

- ▶ Marine Space Remote Sensing and Trajectory Modelling Project
- ▶ Above Ground and Below Ground Carbon Assessment of Mangrove Forests in 2014 for Trinidad and Tobago
- ▶ Hydrological study of the Caroni River Basin

Future Activities



- Regional Expansion of Oil Spill Monitoring Area
- Validation of Oil Satellite Tracking
- PROCARIBE- Marine Spatial Plan for the GoP
- MARIN-Benthic Habitat Mapping

Sargassum Forecasting

GlobalCoast – OceanPredict

Updated Coastline Change Detection

GCF: Mangrove - Blue Carbon

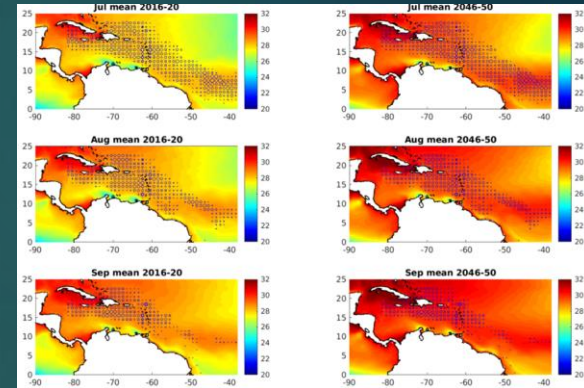
Ocean Health Monitoring

Water Quality Product

Multi-Index for Coral Stress - Ocean Warming and Acidification

Harmful Algal Bloom

Eutrophication



Mapping of Living & Non-Living Coastal Resources

- ▶ Wetlands
 - ▶ Seagrass
 - ▶ Mangroves
- ▶ Benthic Habitats
- ▶ Shorelines and Coastal Zones
- ▶ Climate Change Impacts
- ▶ Ocean Health
- ▶ Marine Pollution

Data
Management

- Metadata Attribution and Standards
- Database & EGIS Management

MARINE DATA
HUB

How to Access the MDH?

- Scan the QR Code



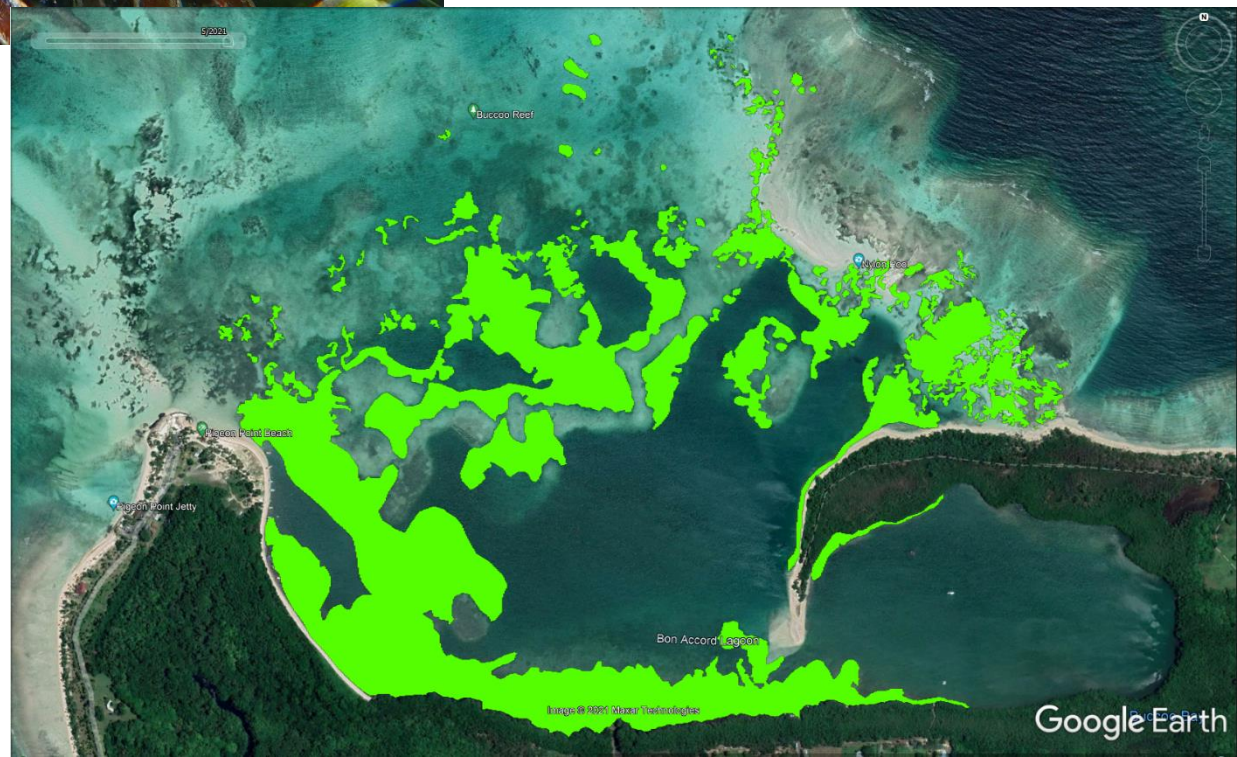
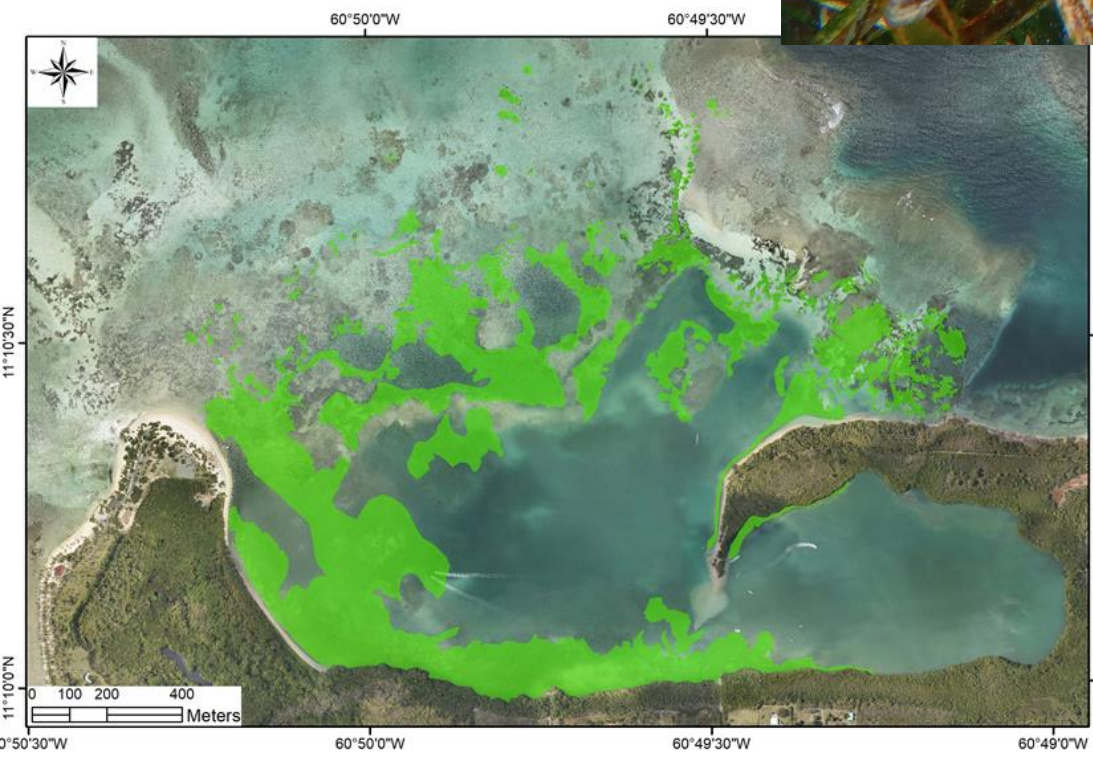
- Visit the MDH Website
 - <https://mdh.ima.gov.tt>
- Visit the IMA Website
 - <https://ima.gov.tt>

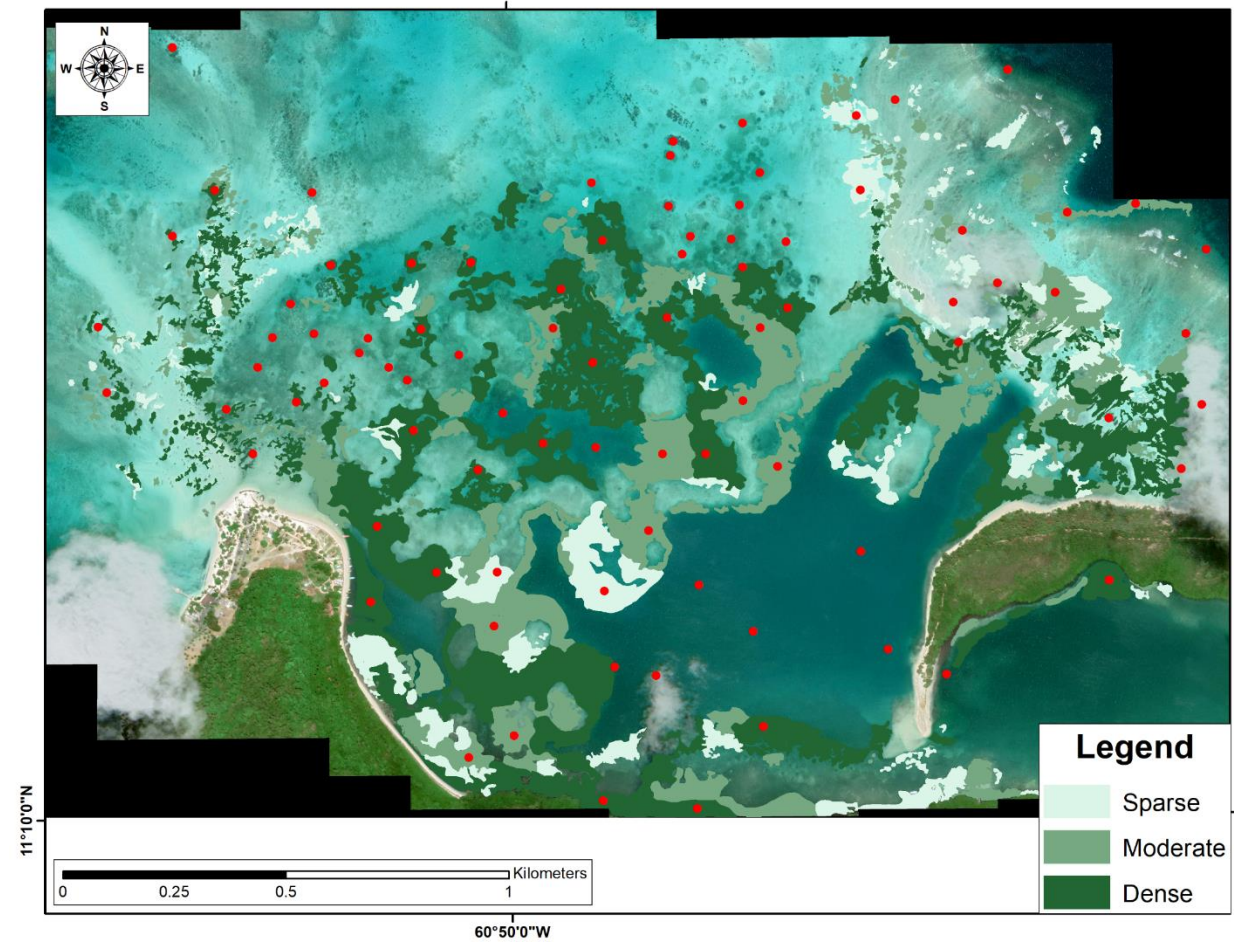
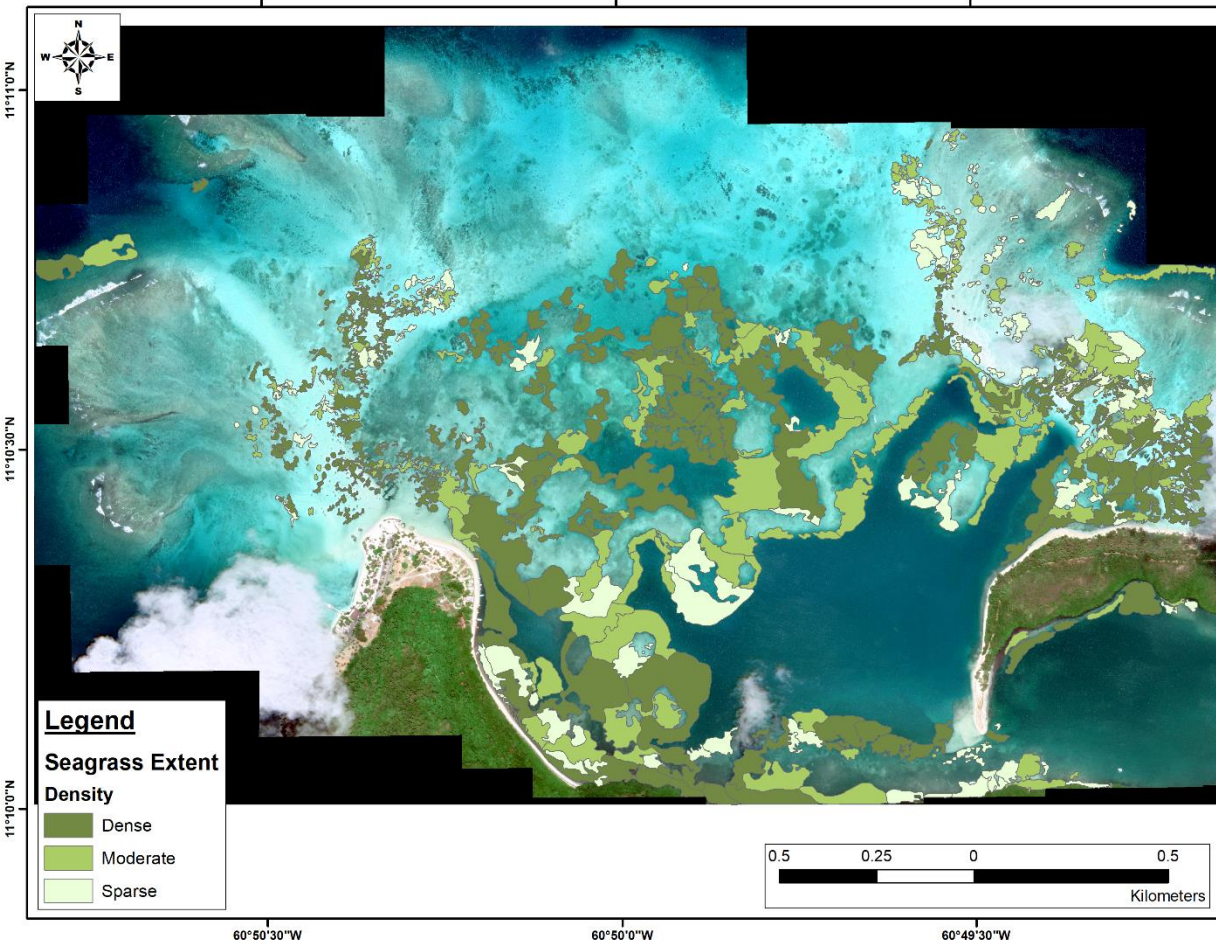


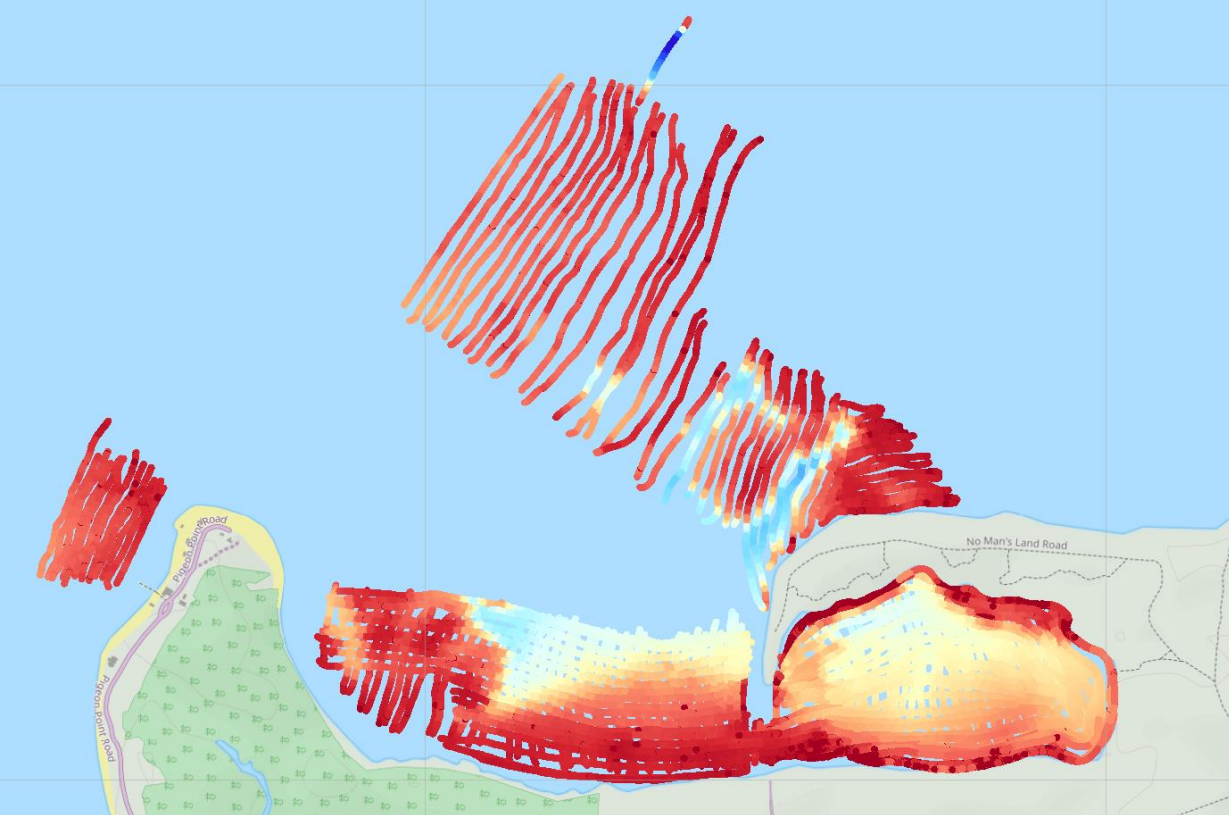
Funded by
the European Union

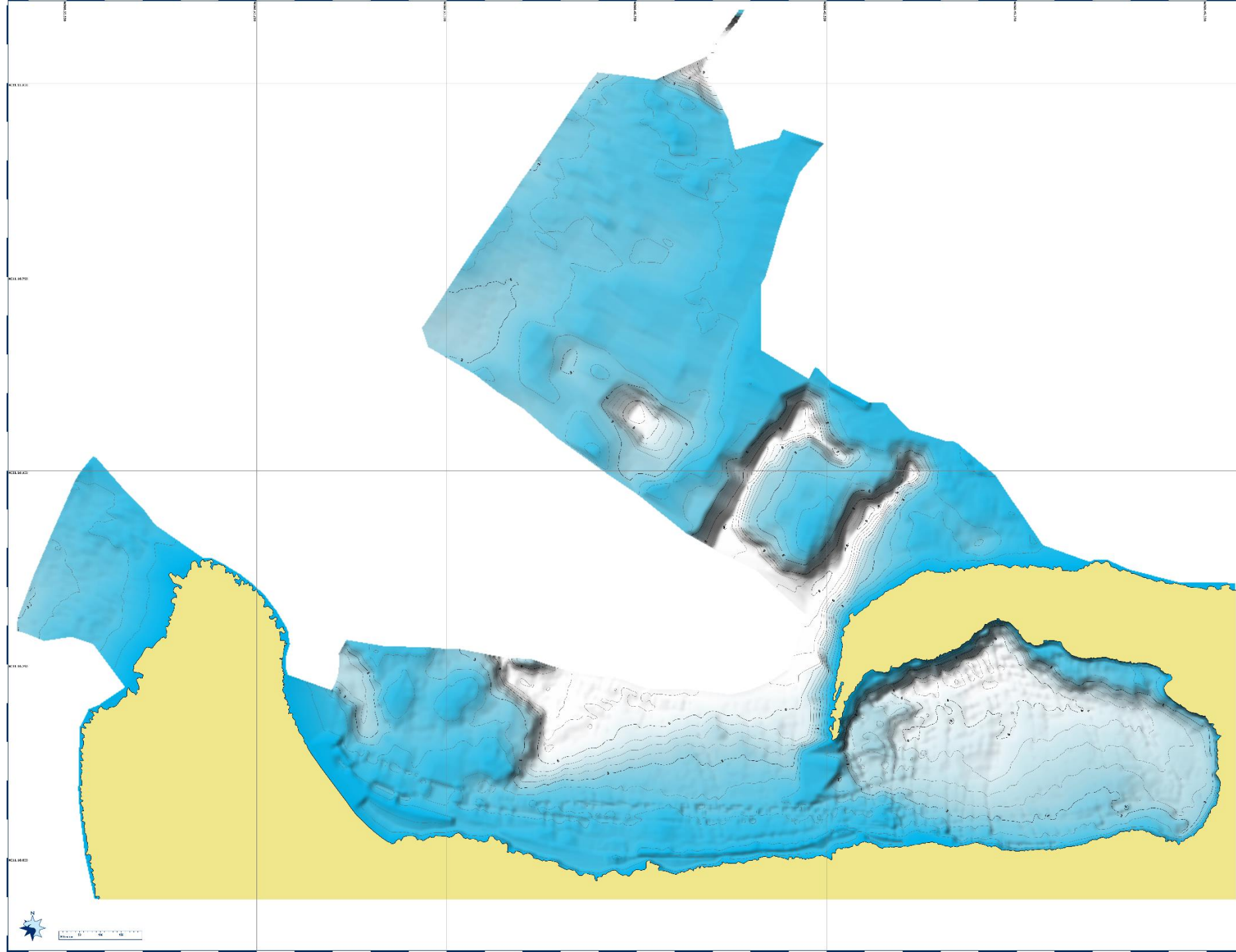


Accessing **Trinidad and Tobago Biodiversity data**

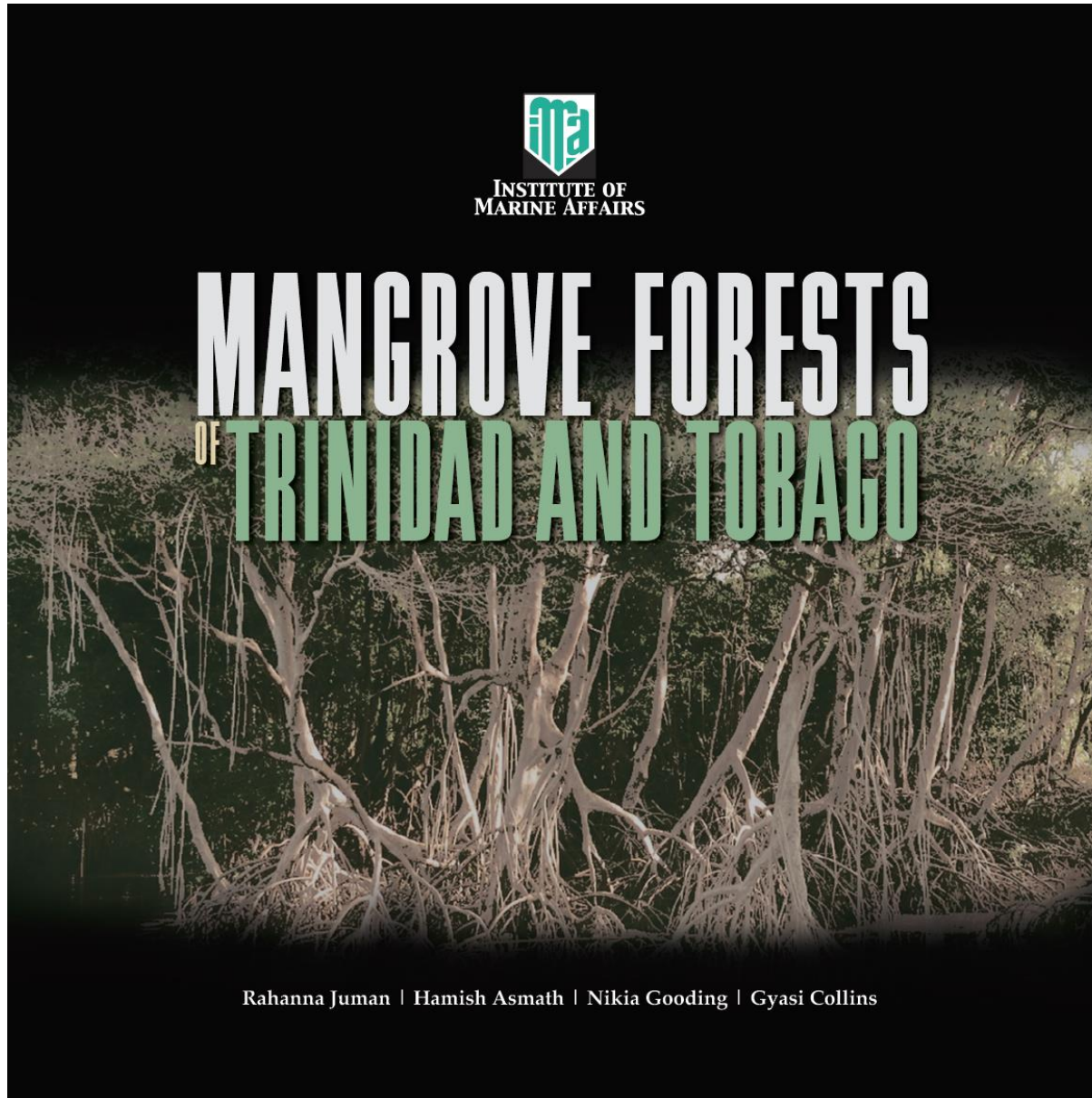








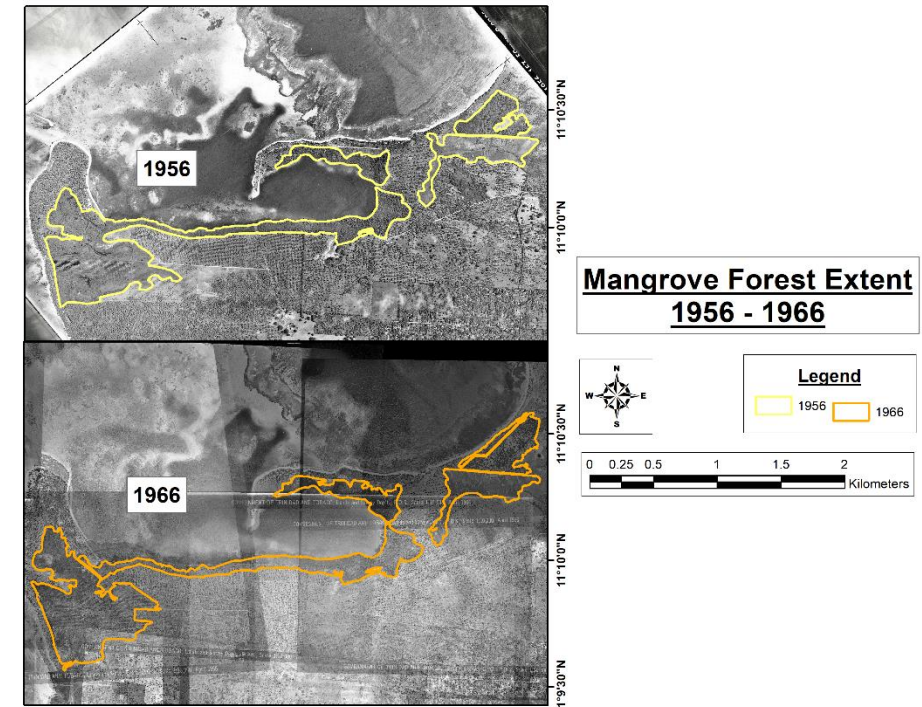
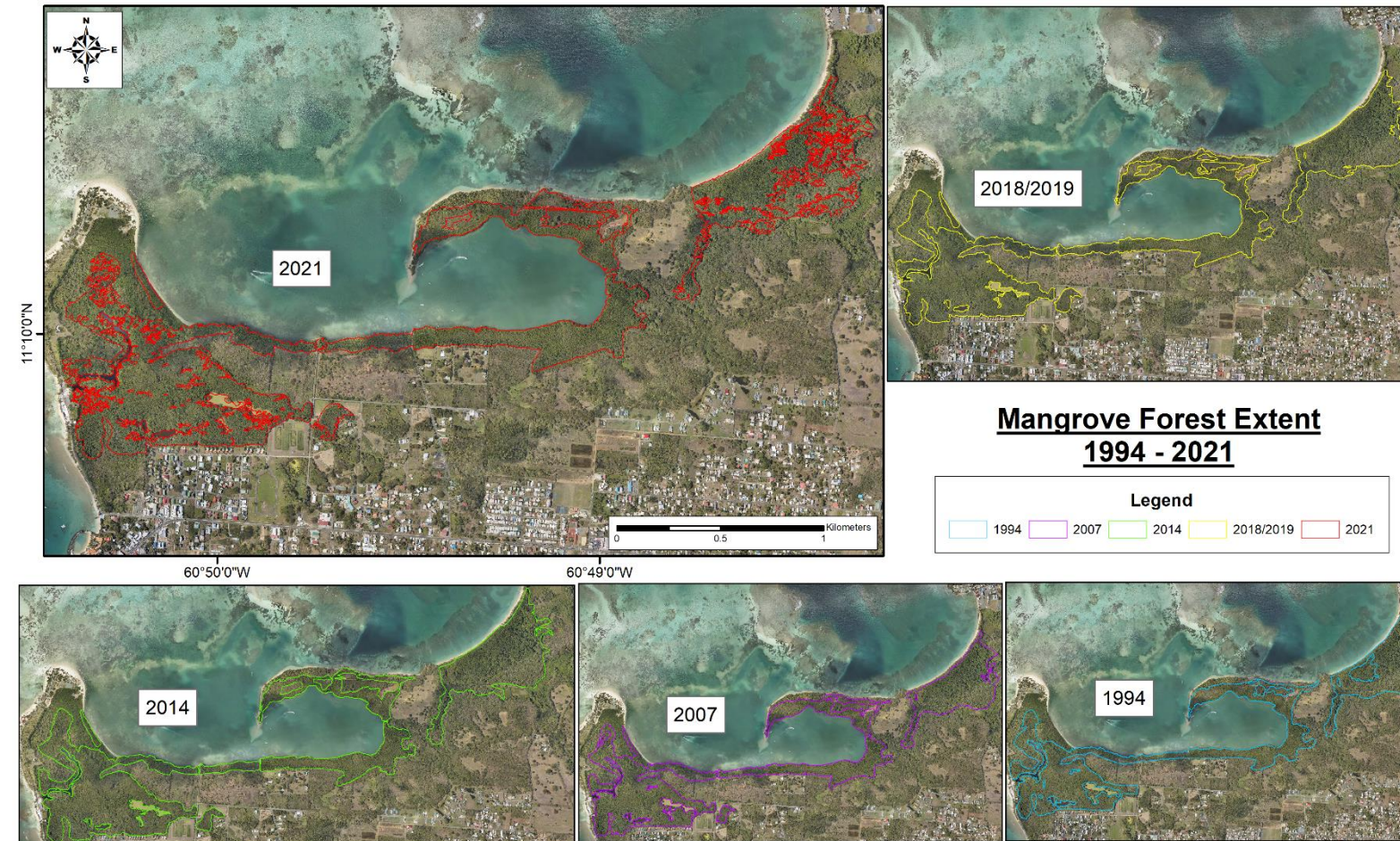
IMA publication on mangrove forests



Funded by Point Lisas
Nitrogen Limited (PLNL)

Mangrove Monitoring

Mangrove Mapping & Change Detection



Oil Spill Detection & Monitoring in Trinidad and Tobago

Ministry of Energy and Energy Industries
Institute of Marine Affairs



Government of the Republic of Trinidad and Tobago
Ministry of Energy and Energy Industries



Oil Spill Monitoring Training



Government of the Republic of Trinidad and Tobago
Ministry of Energy and Energy Industries

Collaboration for Oil Satellite Tracking in the Americas



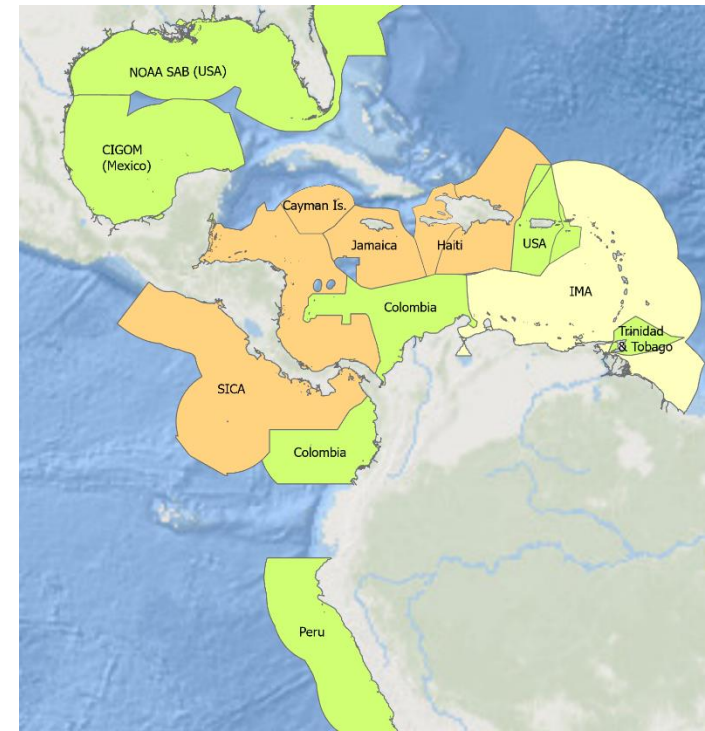
International collaborative effort to build capacity
for near real-time satellite oil spill monitoring

Initial training developed and coordinated by
NOAA- SAB

Partners: Trinidad and Tobago (E and S. Caribbean
sub-regional lead), Mexico, Peru and Colombia.

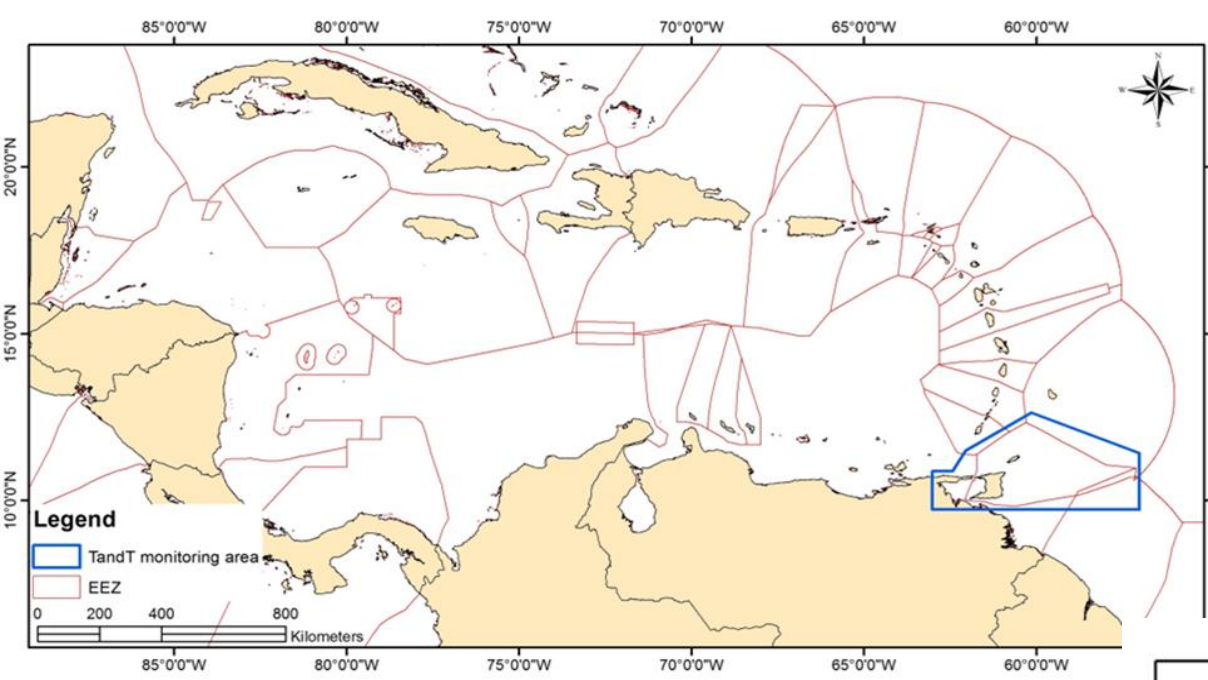
With interests from Central America - SICA
COCOTRAM, Guyana and Jamaica

Supported by UNEP, IOC and GEO



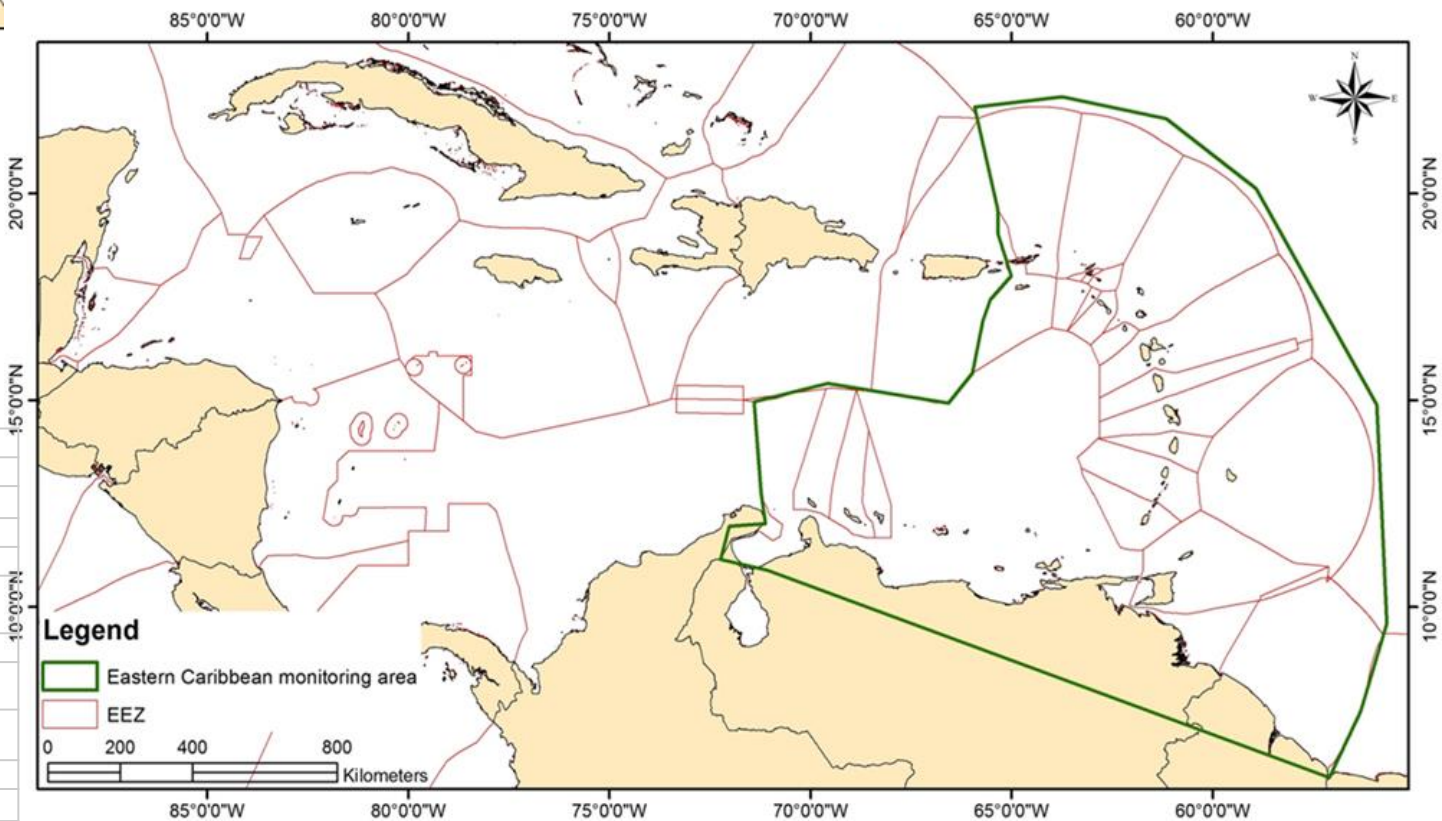
Expansion through COSTA & RAC REMPEITC

Current and Proposed Possible Future Monitoring Extent



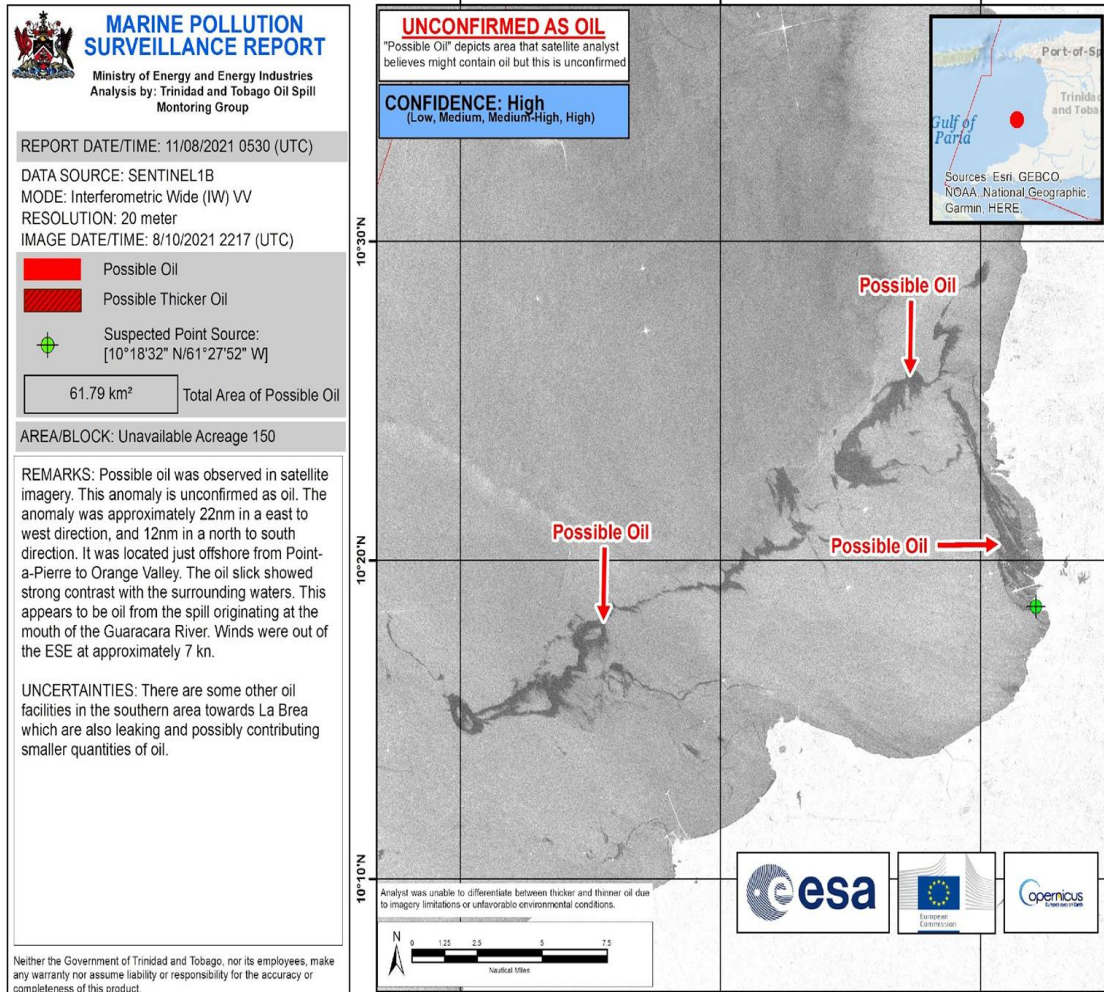
Country/territory name	Outreach, information sent (Y/N)	Outreach, POC replied (Yes/No)
British Virgin Islands	Y	Y
Saint-Martin	No	N/A
Saint-Barthélemy	No	N/A
Aruba	Y	Y
Bonaire	Y	Y
Curacao	Y	Y
Sint Maarten	Y	Y
Sint Eustatius	Y	Y
Saba	Y	Y
Anguilla	Y	No
Saint Kitts and Nevis	Y	Y
Antigua and Barbuda	Y	No

Montserrat	Y	No
Guadeloupe	Y	No
Jamaica	N	Yes
Dominica	Y	No
Martinique	Y	No
Saint Vincent and the Grenadines	Y	Y
Saint Lucia	Y	No
Barbados	Y	Y
Grenada	Y	Y
Venezuela	No	N/A
Guyana	Y	Y

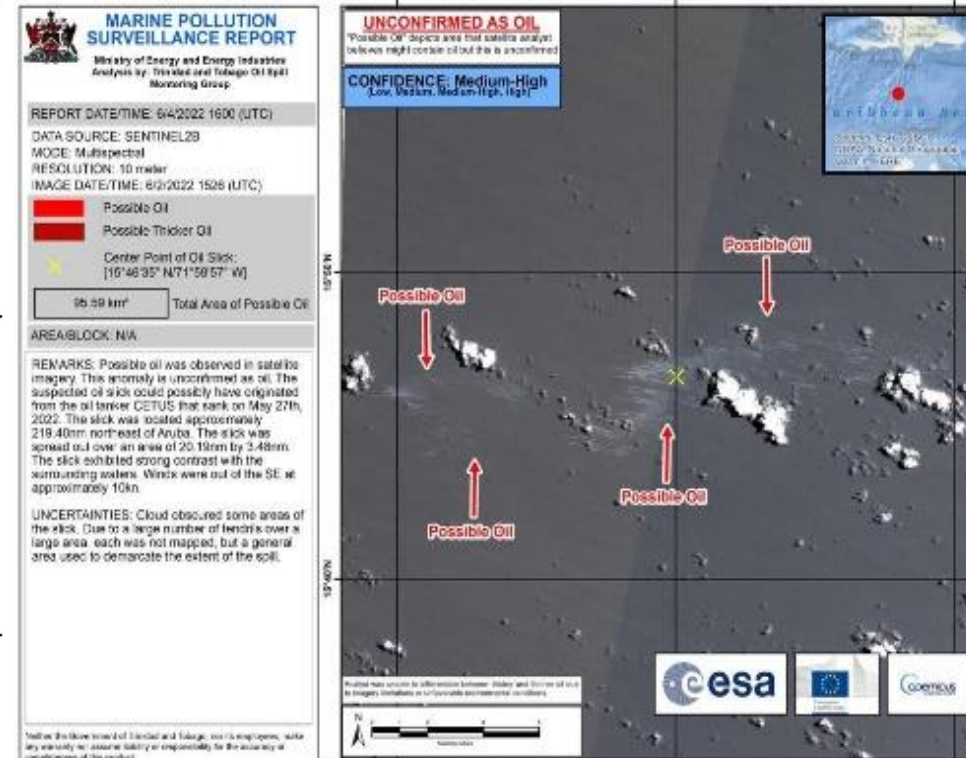


COSTA Oil Reports and Notable¹⁷ Oil Spill Events Supported

2021 Trinidad and Tobago Guaracara oil spill



2022 Sunken Tanker M/V CETUS Oil Spill, Aruba



Picture of the oil spill

Crews were being rescued, covering in oil







MARINE POLLUTION SURVEILLANCE REPORT

Ministry of Energy and Energy Industries
Analysis by: Trinidad and Tobago Oil Spill
Monitoring Group

REPORT DATE/TIME: 9 Feb 1800 (UTC)

DATA SOURCE: SENTINEL2B
MODE: Multispectral
RESOLUTION: 10 meter
IMAGE DATE/TIME: 2/7/2024 1437 (UTC)

Possible Oil

Possible Thicker Oil

Suspected Point Source:
[11°08'01" N/60°46'58" W]

1.17 km²

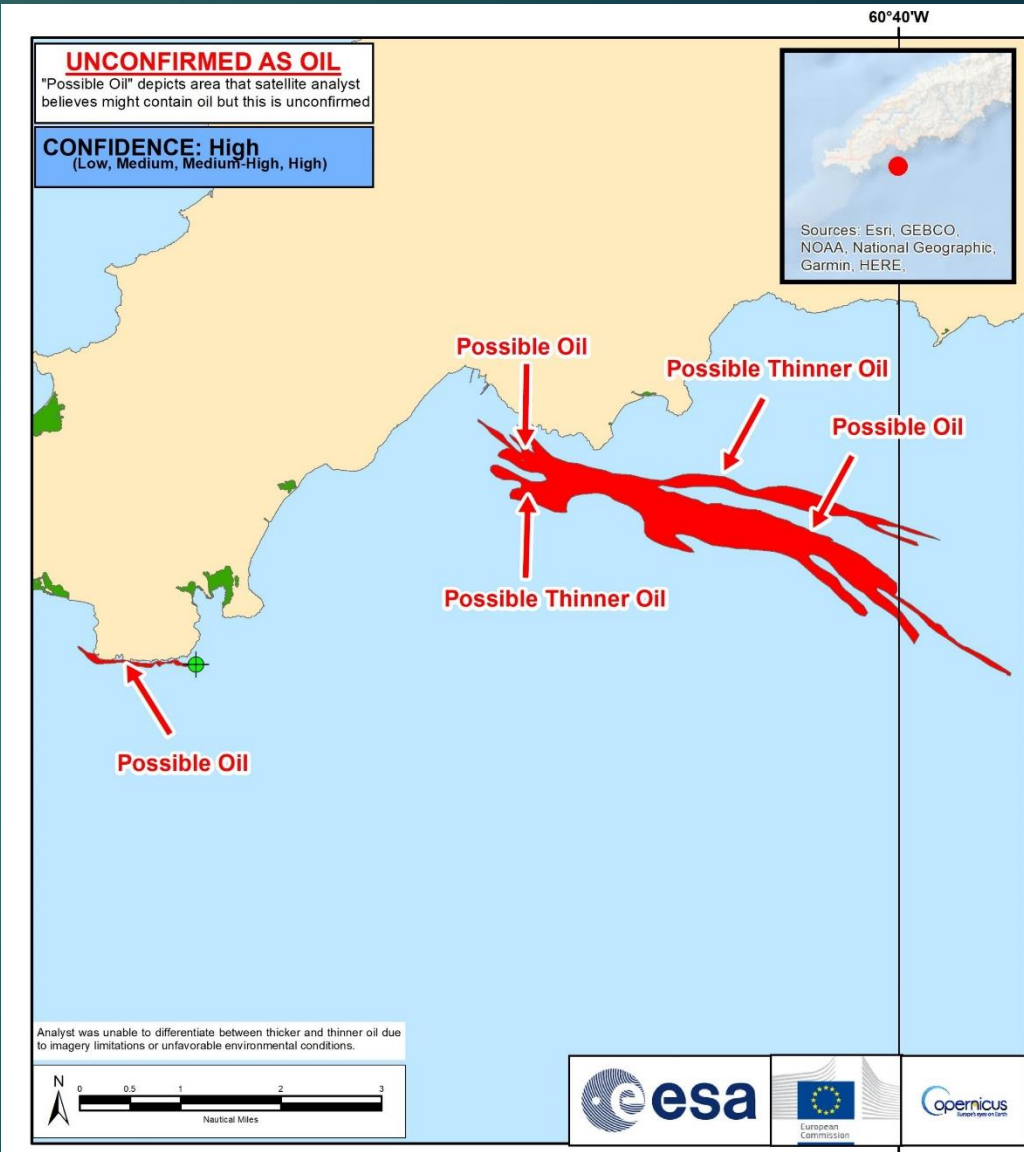
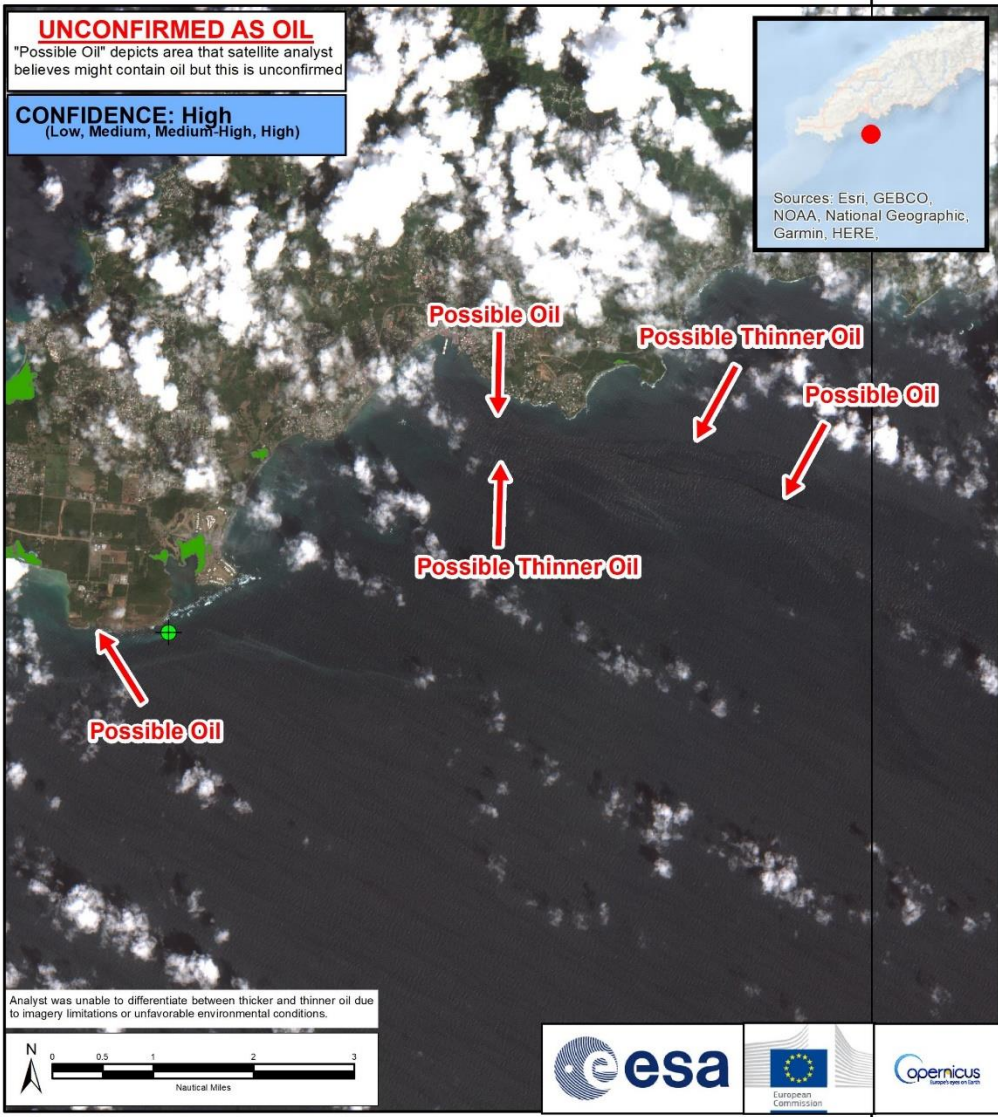
Total Area of Possible Oil

AREA/BLOCK: Unavailable Acreage 151

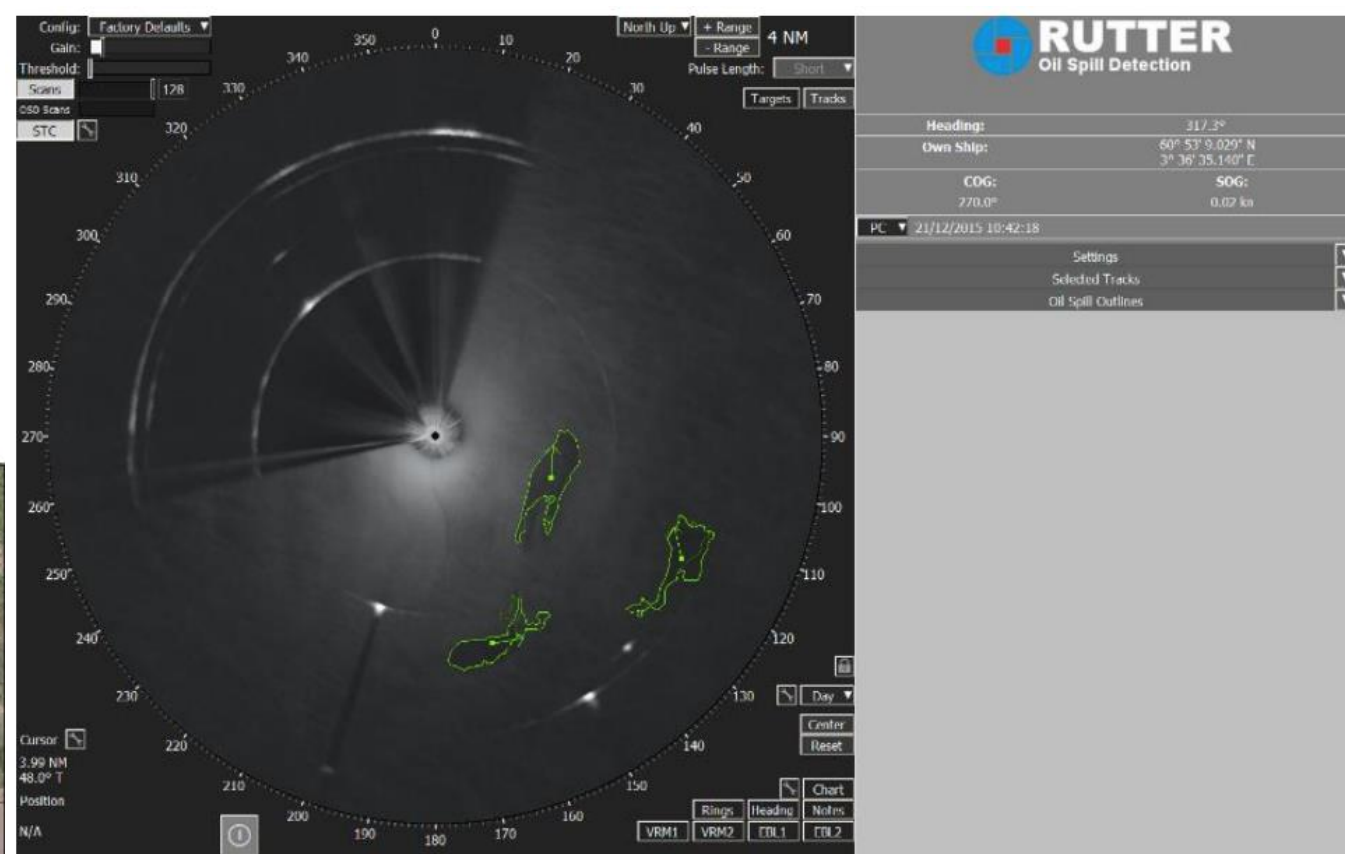
REMARKS: Possible oil was observed in satellite imagery. This anomaly is unconfirmed as oil. The suspected oil slick appeared to have originated from an overturned vessel. The slick was 0.55NM SSE from Cove, Tobago and 0.74NM SSW from Petit Trou Lagoon, Tobago (highlighted green areas) from the point source. The anomaly measured an approximate total of 7.23NM in length and 0.21NM at its widest area. The slick was easily distinguished from natural phenomena. It was observed to have a strong contrast with the surrounding ocean surface. The winds were approximately 10-15kts from the SE 4hrs and 31 after the image was acquired.

UNCERTAINTIES: The confidence level was high due to the known suspected point source. However, the extent of the slick could not be distinguished due to high cloud cover. There was variation of the slick thinner and thin oil was observed in the imagery.

Neither the Government of Trinidad and Tobago, nor its employees, make any warranty nor assume liability or responsibility for the accuracy or completeness of this product.



SAR Tower System



MEEI has 2 towers with mounted radars:

1. Point Gourde, Chaguaramas
2. Tower C, Hyatt, POS

A form of validation

Semi-automatic user system at IMA and the TTCG

Oil Signature Validation

Procurement of Hydrocarbon Consumables

Field Validation with the TTCG to verify oil spill on ocean surface

Fingerprinting if oil is found

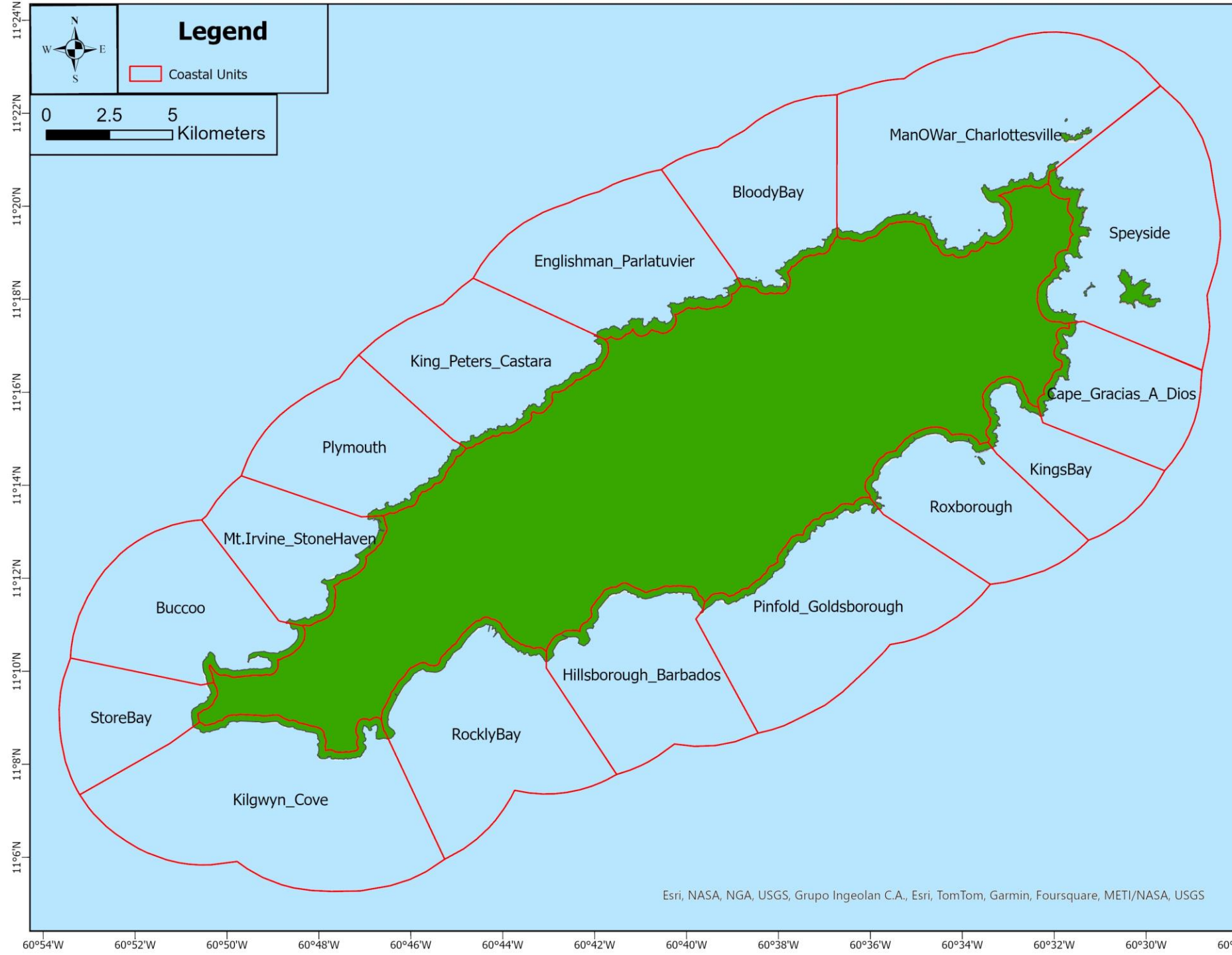


Marine Space Remote Sensing and Trajectory Modelling Project

- To enhance and operationalize the remote sensing and trajectory modelling capability of the IMA.
- Funded under the Public Sector Investment Programme
 - Currently in year 3rd of funding allocation, requesting for an additional 4th year.
- Role as RAC LBS
- Addresses Urgent/Overdue needs – sargassum, ocean health monitoring for climate change impacts etc.

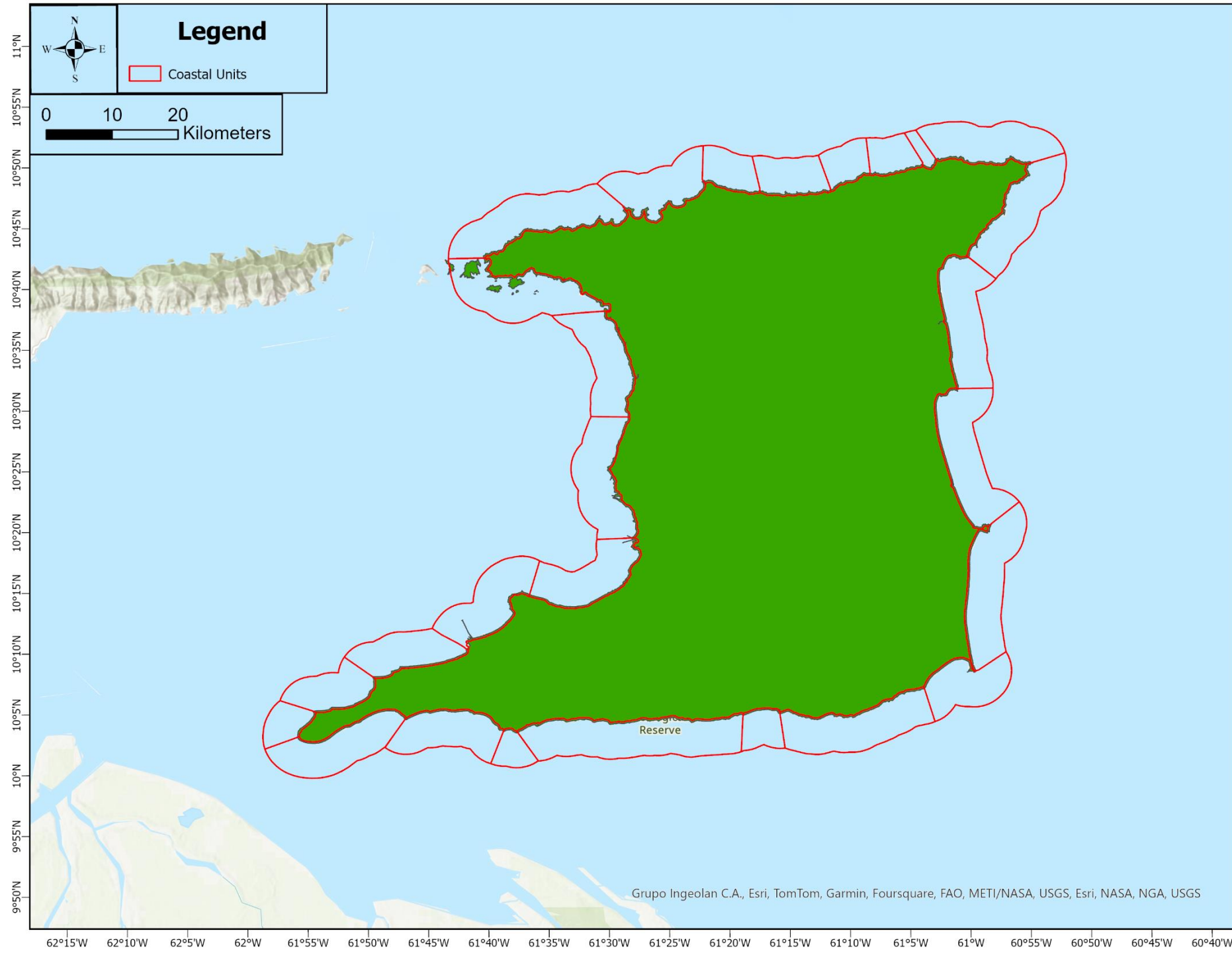
Sargassum Forecasting

- Sentinel2 and 3 Imagery
- Pilot Mapping for April and May
- Maximum Likelihood Analysis
- Trajectory Modelling



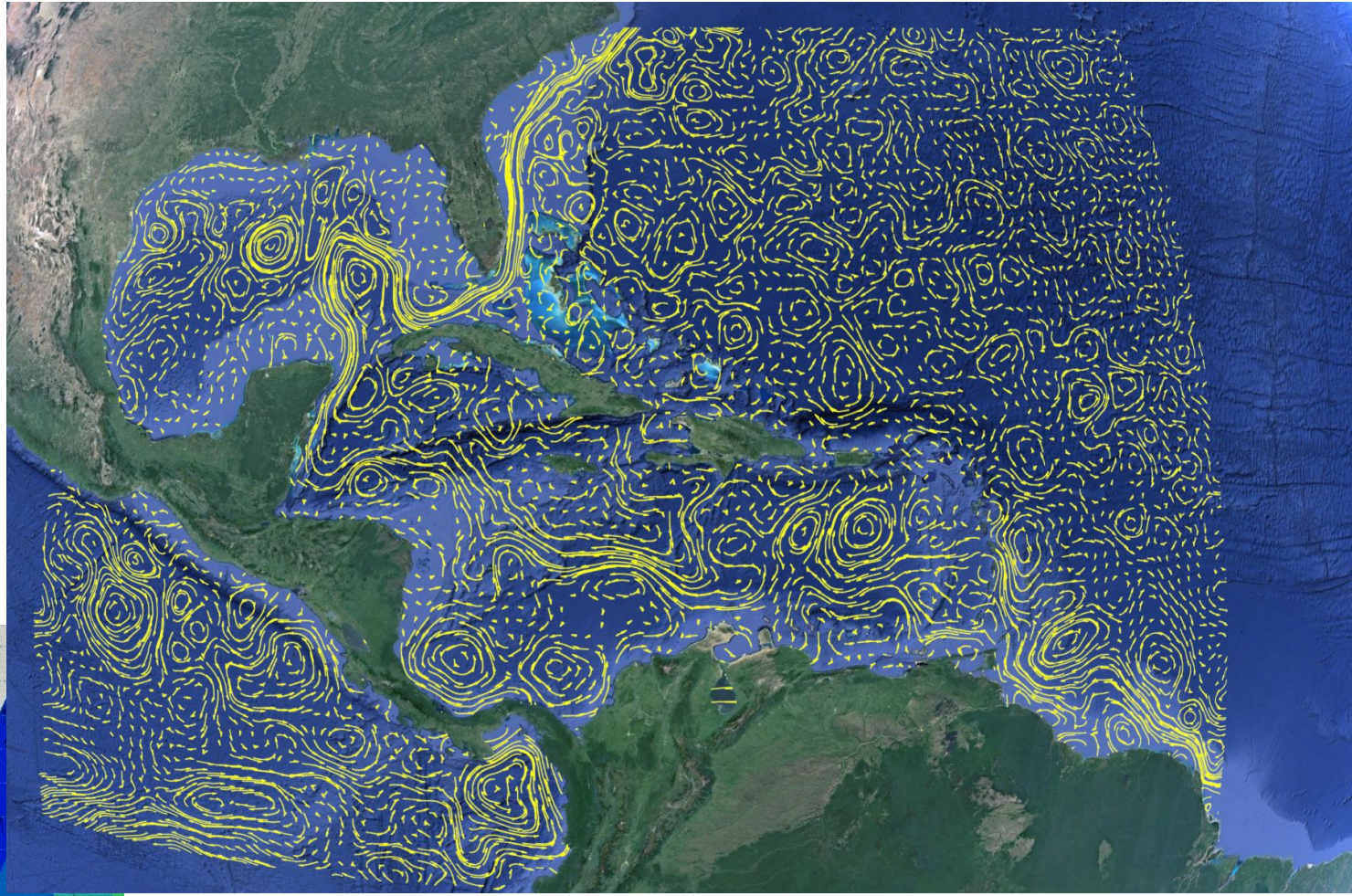
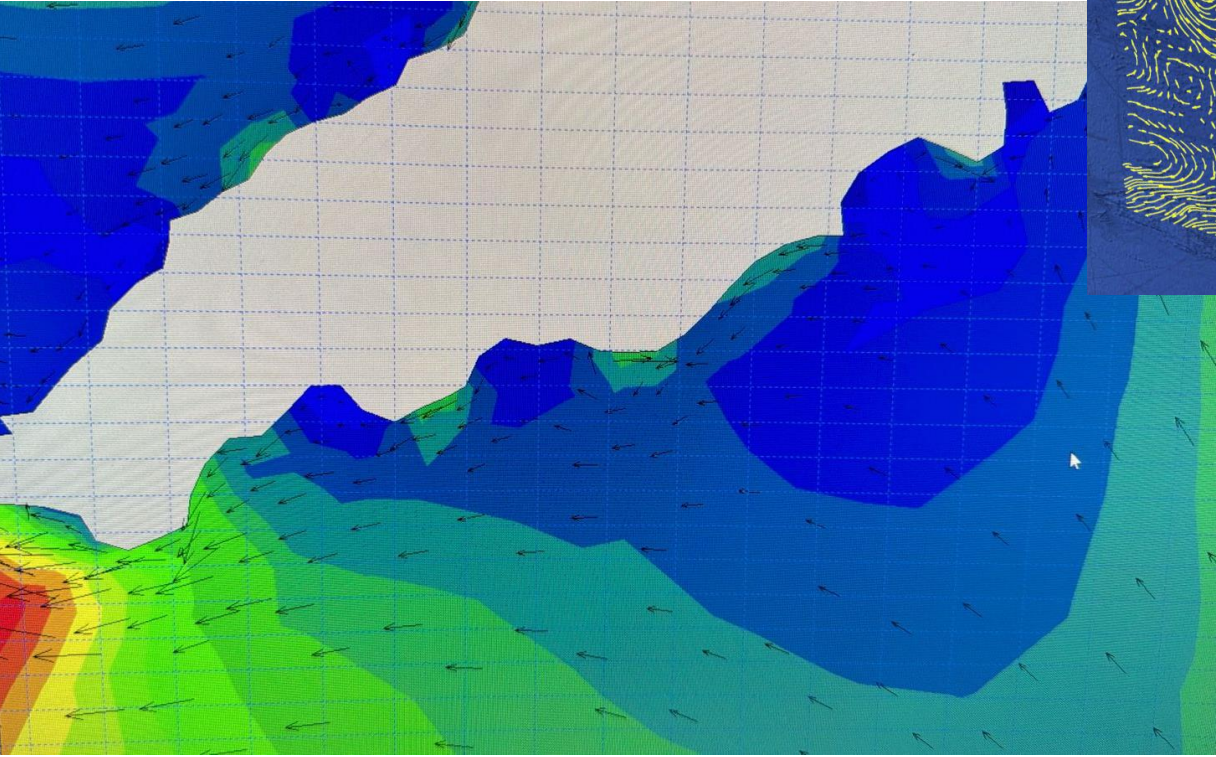
Sargassum Forecasting

- Development of time-frame for forecasting
- Ground-Truthing
- Sensitization Webinar
- Citizen Science – Signage on Beaches



Trajectory Modelling

Using Surface Currents for a prediction of how oil and sargassum is likely to travel on the surface of the ocean.



Ocean Health Monitoring - Water Quality

- Climate Change Impacts:
Rise in CO₂, Rise in SST,
Oxygen Loss – ‘Deadly
Trio’ for Marine
Biodiversity
- Coral Reef Bleaching/
EWS for Coral Reef
Stress
- Ocean Acidification
- EWS for Harmful Algal
Blooms
- Report Card



Mangrove forest aboveground carbon

Getting the volume/biomass of a tree

Diameter at breast
height (DBH)



Tree height



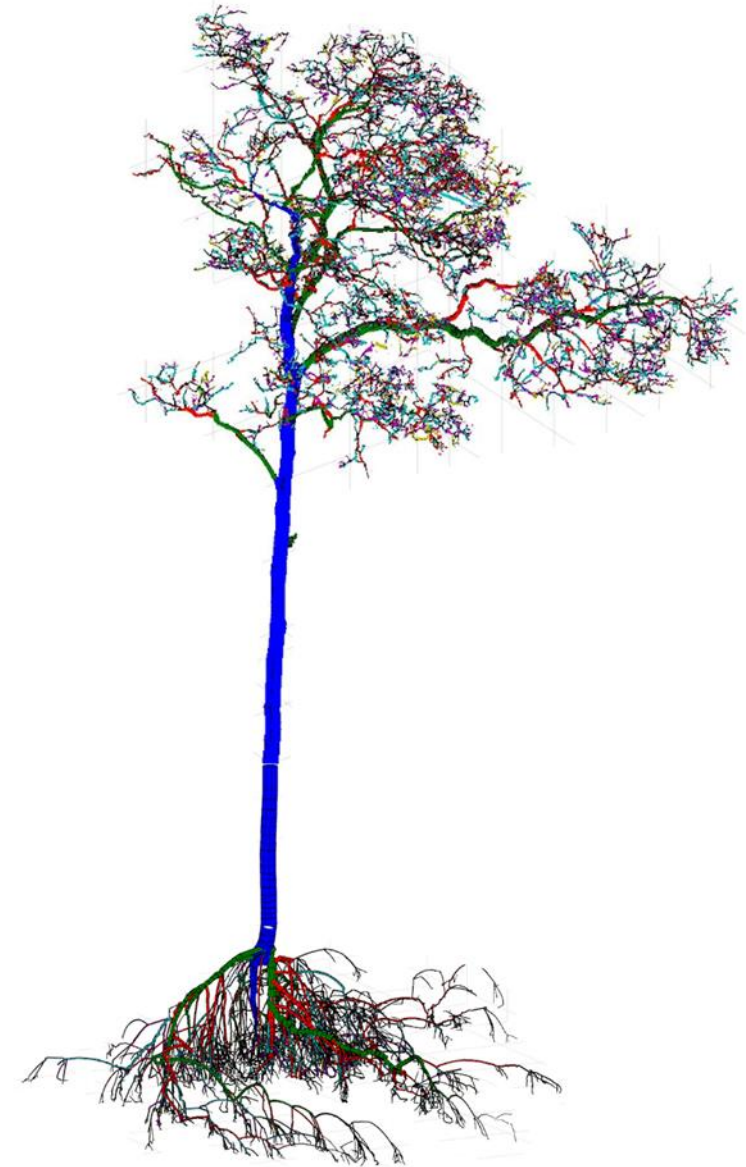
Allometric
equation

Biomass



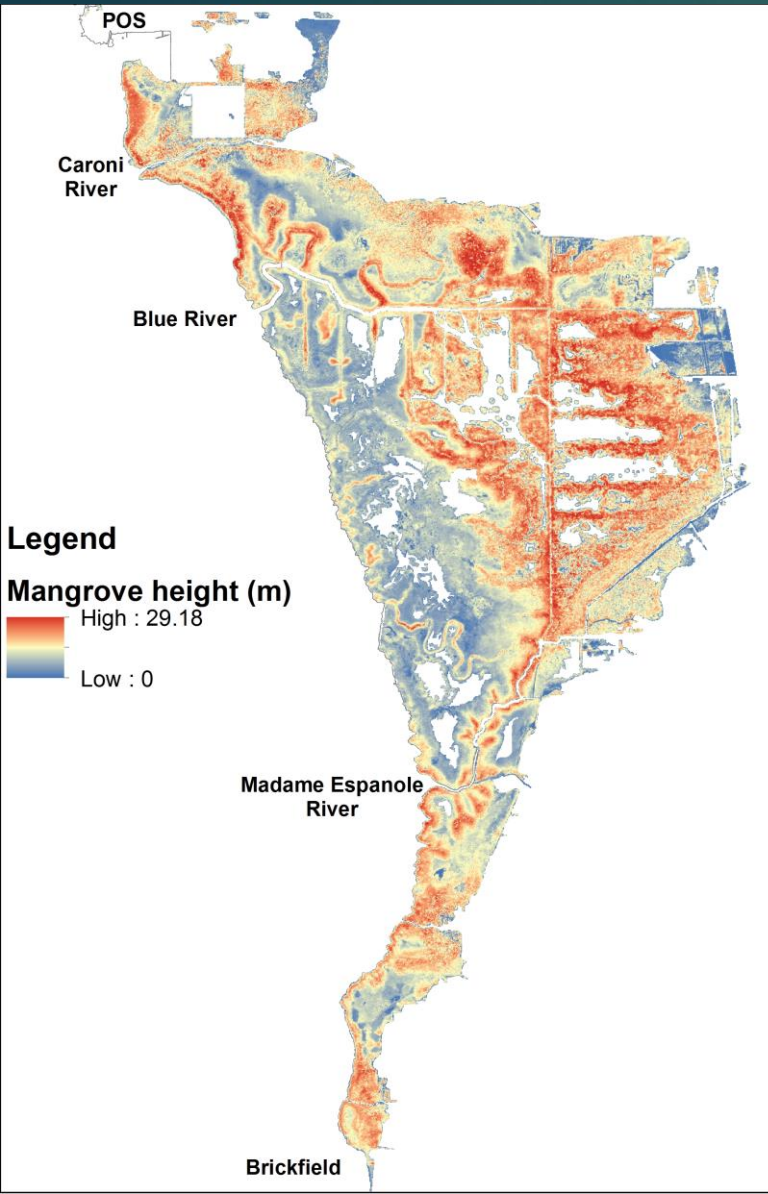
Mangrove forest aboveground carbon

3D laser scanning



Mangrove forest aboveground carbon

Airborne LiDAR survey



- Tree heights
- Combine with plot carbon measurements
- Result is a predictive equation of aboveground mangrove forest carbon for all of Trinidad and Tobago
- Mangrove forest above and below ground carbon is 1,118,630.99Mg

Mangrove forest aboveground carbon

Mangrove forest plot measurements



Wood
corer



Wood
core

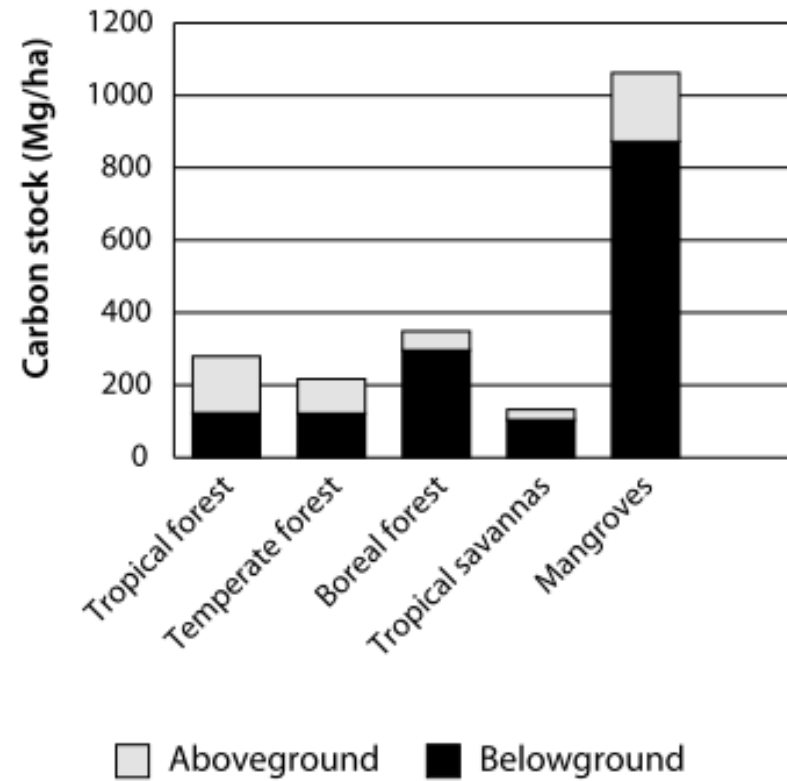


Elemental
analyser

Mangrove soil carbon



Mangrove soils



Kauffman and Donato, 2012

ASSESSING MANGROVE BLUE CARBON STORAGE AND SEQUESTRATION IN TRINIDAD AND TOBAGO FOR PARTICIPATION IN CARBON MARKETS

Activities

- Quantifying mangrove soil carbon in Trinidad and Tobago
- Assessment mangrove aboveground carbon sequestration from 2014 to present using LiDAR
- Eddy covariance and carbon flux balance integrated across annual cycles for mangrove forests.
- Development and implementation of framework for participation in blue carbon markets.

Deliverables

- Mangrove Carbon Map for Trinidad and Tobago – a depiction of above and below ground carbon (biomass and soil carbon) stocks.
- Qualification for advanced payments under Tier 3 UNFCCC REDD+ scheme
- Quantification of carbon sequestration rates for qualification on international markets.
- Assessment in change of carbon storage from 2014 to 2024



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EU COMPONENT TO GLOBAL OCEAN OBSERVATIONS

Implemented by



**MERCATOR
OCEAN**
INTERNATIONAL



BLUE PLANET



EO Value Chain
Case Study